November 2000

Title: *Magnetosphere Turbulence*

Cluster: *Cross-Theme Theory and Data Analysis/SECTP*

Contributor: *George Siscoe/Boston University*

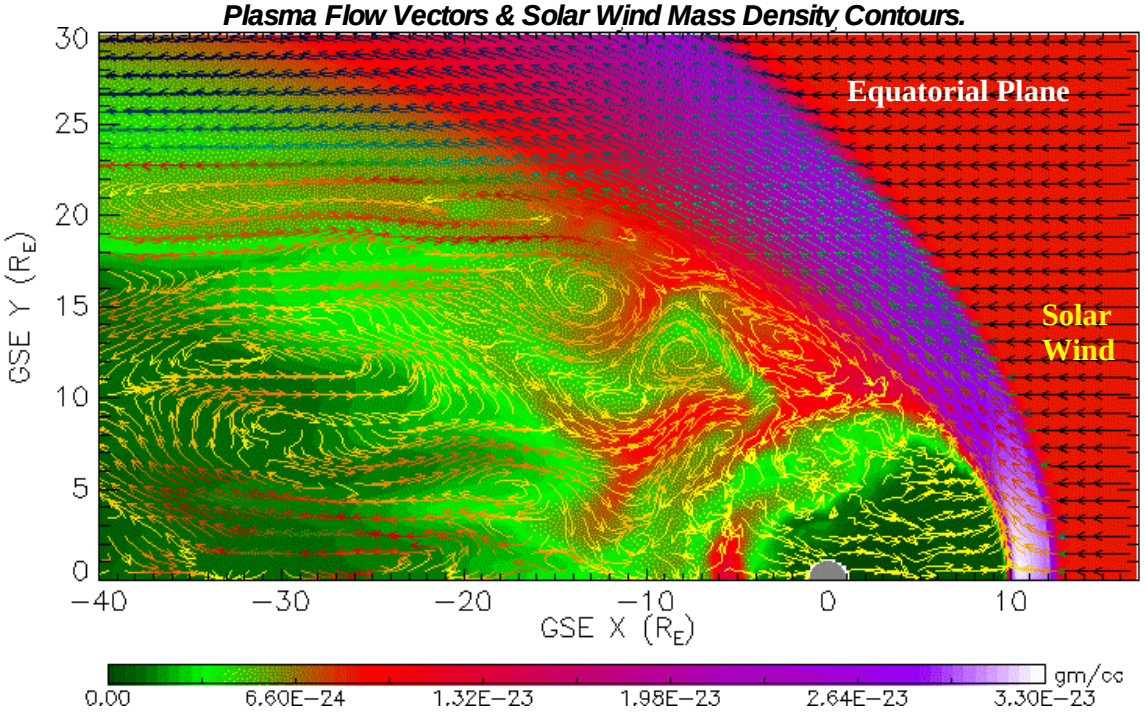
- **Mesoscale Turbulence – The Natural Magnetosphere State**

The Earth's magnetosphere is known to be the home of mesoscale turbulence. The Integrated Space Weather Prediction Model (ISM), funded under SECTP, now allows one to follow the life cycles of mesoscale structures. Spectacularly, even with steady state interplanetary conditions ISM calculations show that the magnetosphere is a plethora of time varying mesoscale features. The turbulence changes character from highly irregular and short scale in the inner magnetosphere to mesoscale eddies in the near magnetotail, to waves in the middle and far magnetotail. This is the first indication that magnetospheric turbulence comes in different kinds that depend on location. The figure below is only one frame from a movie that follows the evolution of the structures in time.

Because of the time varying and complex turbulent structure, modeling such as this is required to guide and interpret observations from multi-spacecraft magnetosphere missions such as Cluster II, and the Solar Terrestrial Probe Magnetosphere Multiscale and Constellation missions.

Turbulence in the Earth's Magnetosphere (No Interplanetary Magnetic Field)

Plasma Flow Vectors & Solar Wind Mass Density Contours.



Reference: White, W. W., et al., Modes of mesoscale magnetospheric dynamics: Dependence on IMF orientation, AGU Monograph on Space Weather, in press, 2000